REMARKS

Claims 1-24 and 26-46 are pending in the application. Claim 25 was previously canceled. Claims 1, 6, 13, 23, 24, 30, 32-34, 39, 41, 43 and 45 have been amended by way of the present amendment. Reconsideration is respectfully requested.

In the outstanding Office Action, claims 1, 13, 23, 24, 39, 41 and 43 were objected to due to informalities; claims 1, 2, 5-28 and 31-46 were rejected under 35 U.S.C. Section 102(e) as being anticipated by US 2003/0203743 (Sugar et al_1); and claims 3, 4, 29 and 30 were rejected under 35 U.S.C. Section 103(a) as being anticipated by US 2004/0072546 (Sugar et al_2). Reconsideration is respectfully requested.

Claim Objections

Claims 1, 13, 23, 24, 39, 41 and 43 were objected to due to informalities. Reconsideration is respectfully requested.

Claims 1, 13, 23, 24, 30, 39, 41, 43 and 45 have been amended in accordance with the suggestions made in the outstanding Office Action. The amendments were made to clarify the invention and are supported by the original specification, claims and figures. Therefore, it is respectfully submitted that the amendments raise no question of new matter and respectfully requested that the outstanding objection be withdrawn.

35 U.S.C. Section 102 Rejections

Claims 1, 2, 5-28 and 31-46 were rejected under 35 U.S.C. Section 102(e) as being anticipated by Sugar et al_1. Reconsideration is respectfully requested.

Independent claims 1, 13, 23, 24, and 45 have been amended to clarify the invention. In particular, claim 1 has been amended to recite:

[A] radio frequency (RF) multi-antenna access point system implemented in a single chip integrated circuit chip (IC) comprising:

a baseband processor circuit located in a first portion of the single chip IC, the baseband processor circuit to handle data transmissions during a first operating mode in a channel between a first access point and a second access point; and

a multi-antenna signal processing circuit located in ~~a~~ an Application Specific Integrated Circuit (ASIC) in a second portion of the single chip IC, the multi-antenna signal processing circuit to handle data transmissions during a second operating mode in said channel, said multi-antenna signal processing circuit being further ~~adapted to~~:

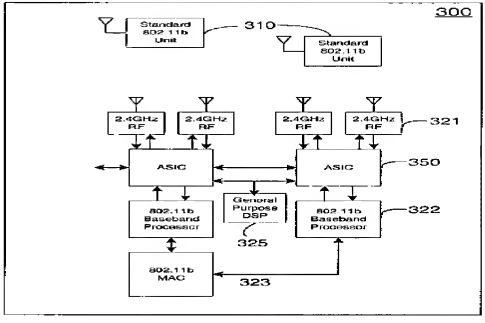
(a) configured to receive M independent RF modulated input signals from said second access point; and

(b) configured to process said M independent RF modulated input signals using a channel mixing matrix and estimated channel coefficients b1, b2 to extract N independent data signals transmitted by said second access point;

wherein said first operating mode and said second operating mode are to be automatically selected by the RF multi-antenna access point system based on a transmission condition in said channel.

The remaining independent claims have been similarly amended. Support for the amendments is provided at least by the original specification, figures and claims. In particular, as shown in **FIG. 3A** below and **FIG. 3B**; and as discussed in the specification of the access point system **300** of the single chip IC comprises one or more antenna/analog front end circuits **321**, a plurality of multi-antenna signal processing application specific integrated circuits (ASICs) **350;** and a plurality of 802.11b baseband processors **322** (i.e., *see* **FIG. 3A**). In particular, ASICs **350** further comprises the recited "channel mixing matrix" or Separation Matrix Multiplier **355**, as shown in **FIG. 3B**.

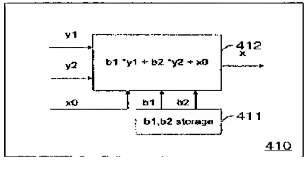
Fig. 3A



Further, as shown in **FIG. 4A** below and disclosed by the specification, the recited "channel mixing matrix" (a.k.a., the Separation Matrix Multiplier **355)** performs the following operation in the computation module **412** of the ASIC **350** when in receiving mode:

$$x=b1*y1+b2*y2+x0,$$

Fig. 4A



where b1 and b2 are calculated as *estimated channel equalization coefficients*; x0 is a recovered signal from the adjacent ASIC **350**; y1 and y2 are two received data from the two baseband channels of the current ASIC **350**; and x is the recovered signal from the current ASIC. Alternatively, in the transmit mode, ASIC **350** calculates b1 and b2 as *estimated channel pre-equalization coefficients*.

Furthermore, the specification discloses the enhanced receiver ASIC **350** and the standard baseband processor **380** operate simultaneously in the single chip IC Access Point (AP). In particular, when a user station **310** is in a first region, within a certain range of the AP, a communication link is established between the single chip IC AP and the user station in the recited "first mode," of the claims through the standard 802.11b baseband processor **380**, as long as the AP satisfies a link throughput (data rate).

Moreover, the specification discloses the enhanced receiver ASIC **350** can be selectively activated in a recited "second mode," of the claims if:

(1) a user station moves to a second region which is beyond the first region/certain range; or

(2) there is only a low data rate available in the first region due to the poor reception.

In either of the situations discussed in item (1) or (2) above, the specification discloses the enhanced multi-antenna receiver processor ASIC **350**:

(a) *estimates the channel conditions* (e.g., by using a frame of data which a standard 802.11b baseband processor chip set can not decode) *using equalization and pre-equalization coefficients* for receive mode and transmit mode, respectively (emphasis added); and

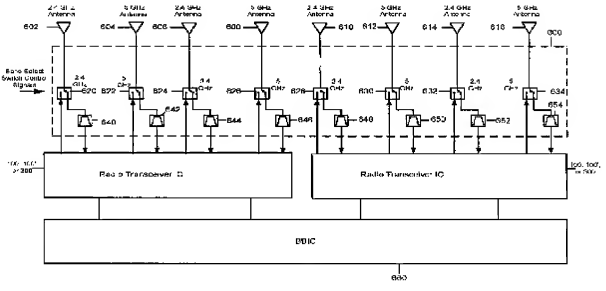
(b) subsequently transmits data, mainly under a point coordination function (PCF) mode.

In consideration of the above disclosures from the original specification, claims and figures, it is respectfully submitted that the amendments raise no questions of new matter.

Sugar et al_1 discloses a multiple-input multiple-output (MIMO) radio transceiver that supports processing of multiple signals for simultaneous transmission via a plurality of antennas and supports receive processing of multiple signals detected by the plurality of antennas.[1] In particular, Sugar et al_1 discloses a radio transceiver integrated circuit **100, 100', 300** and **670** (*see* **FIGs. 2-4,** and **9,** respectively) coupled to a baseband integrated circuit (BBIC) **510**, as shown in **FIGs. 6** and **7**, and BBIC **660**, as shown in **FIG. 9**.

Further, **FIG. 9** of Sugar et al 1 discloses a front-end section **600** that interfaces with two radio transceiver ICs to provide a 4 path MIMO radio transceiver device and, for example, may be used in an access point (AP) for a WLAN. Furthermore, a shown in **FIG. 9** below, Sugar et al 1 discloses the front-end section **600** interfaces two radio transceiver ICs to eight antennas **602** through **616**; a BBIC **660** is coupled to the two radio transceiver ICs that operate in tandem to

FIG. 9



[1] Sugar et al_1, at ABSTRACT.

transmit 4 weighted components of a single signal or to receive 4 components of a single received signal; antennas **602, 606, 610** and **614**, dedicated to one frequency band (i.e., 5 GHz); antennas **604, 608, 612** and **616**, dedicated to another frequency band (i.e., 2.4 GHz); transmit/receive switches eight **620** through **634** are each associated with one of the antennas **602** through **616**, respectively; and eight bandpass filters **640** through **654** coupled to the transmit/receive switches **620** through **654**.

However, Sugar et al_1, nowhere discloses as claim 1 has been amended to recite:

> *a multi-antenna signal processing circuit located in an Application Specific Integrated Circuit (ASIC) in a second portion of the single chip IC*, the multi-antenna signal processing circuit to handle data transmissions during a second operating mode in said channel, said multi-antenna signal processing circuit being further :
> (a) configured to receive M independent RF modulated input signals from said second access point; and
> (b) *configured to process said M independent RF modulated input signals using a channel mixing matrix and estimated channel coefficients b1, b2 to extract N independent data signals transmitted by said second access point* (emphasis added).

The remaining independent claims have been similarly amended. That is, Sugar et al_1, nowhere discloses "using a channel mixing matrix and estimated channel coefficients b1, b2," as recited in the independent claims. Further, the outstanding Office Action points to **FIG. 2** and paragraphs 39-41 of Sugar et al_1 as teaching the channel mixing matrix. However, it is respectfully submitted that using "estimated channel coefficients" is nowhere disclosed in Sugar et al_1.

Moreover, with regards to dependent claims 6 and 32, which recite the equation using the above recited "channel coefficients b1, b2," page 4, lines 7-11 of the outstanding Office Action indicates the *baseband transceiver* operation of Sugar et al_1 as disclosing this limitation of the invention. However, it is respectfully submitted that, as discussed above, the computation of the channel coefficients occurs in the "ASIC" and *not* in the "baseband processor." Thus, it is respectfully submitted that Sugar et al_1 actually teaches away from the structure and function of the claimed invention.

Therefore, in consideration of the above discussion, it is respectfully submitted that Sugar et al_1 does not disclose, anticipate or inherently teach all of the limitations of the claimed invention and that independent claims 1, 13, 23, 24, and 45, and claims dependent thereon patentably distinguish thereover.

35 U.S.C. Section 103 Rejections

Claims 3, 4, 29 and 30 were rejected under 35 U.S.C. Section 103(a) as being anticipated by Sugar et al_1 in view of Sugar et al_2. Reconsideration is respectfully requested.

Claims 3 and 4; and 29 and 30, are ultimately dependent upon independent claims 1 and 24, respectively. As discussed above, Claims 1 and 24 are *not* disclosed by Sugar et al_1. Thus, at least for those reasons, claims 3, 4, 29 and 30 also are *not* disclosed by Sugar et al_1.

In addition, the outstanding Office Action acknowledges other deficiencies in Sugar et al_1 and attempts to overcome those deficiencies by combining Sugar et al_2 with Sugar et al_1. However, Sugar et al_2 *cannot* overcome all of the deficiencies of Sugar et al_1, as discussed below.

Sugar et al_2 discloses an equal gain composite beamforming technique which constrains the power of the signal output by each antenna is the same, and is equal to the total power of the transmit signal divided by the number N of the transmit antennas from which the signal is to be transmitted.[2] However, Sugar et al_2, nowhere discloses as claim 1 has been amended to recite:

> *a multi-antenna signal processing circuit located in an Application Specific Integrated Circuit (ASIC) in a second portion of the single chip IC*, the multi-antenna signal processing circuit to handle data transmissions during a second operating mode in said channel, said multi-antenna signal processing circuit being further :
>
> (a) configured to receive M independent RF modulated input signals from said second access point; and
>
> (b) *configured to process said M independent RF modulated input signals using a channel mixing matrix and*

[2] Sugar et al_2 at ABSTRACT.

estimated channel coefficients b1, b2 to extract N independent data signals transmitted by said second access point (emphasis added).

The remaining independent claims have been similarly amended and claims 3 and 4; and 29 and 30, are ultimately dependent upon claims 1 and 24. That is, Sugar et al_2, nowhere discloses "using a channel mixing matrix and estimated channel coefficients b1, b2," as recited in the independent claims. Thus, Sugar et al_2 cannot overcome the deficiencies of Sugar et al_1. Therefore, in consideration of the above discussion, it is respectfully submitted that neither Sugar et al_1 or Sugar et al_2 , whether taken alone or in combination, do not disclose, suggest or make obvious the claimed invention and that independent claims 1 and 24, and claims dependent thereon (i.e., 3, 4, 29 and 30), patentably distinguish thereover.

Conclusion

In view of the above, consideration and allowance are respectfully solicited.

In the event the Examiner believes an interview might serve in any way to advance the prosecution of this application, the undersigned is available at the telephone number noted below.

The Office is authorized to charge any necessary fees to Deposit Account No. 22-0185, under Order No. 27592-00275-US2 from which the undersigned is authorized to draw.

Dated: July 29, 2008

Respectfully submitted,

Electronic signature: /Myron Keith Wyche/
Myron Keith Wyche
Registration No.: 47,341
CONNOLLY BOVE LODGE & HUTZ LLP
1875 Eye Street, NW
Suite 1100
Washington, DC 20006
(202) 331-7111
(202) 293-6229 (Fax)
Agent for Applicant